



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

Fl

28.4 71

H29



3 2044 106 354 830



Digitized by Google

LIST OF PLANTS

FOUND ON THE

PLAINS OF WESTERN DAKOTA AND EASTERN MONTANA

DURING THE

SUMMER OF 1877 AND SPRING OF 1879,

BY

V. H A V A R D ,

ASSISTANT SURGEON, U. S. A.;

BEING PART OF

APPENDIX S S

OF THE

ANNUAL REPORT OF THE CHIEF OF ENGINEERS FOR 1880

Fl

HARVARD UNIVERSITY HERBARIUM.

X. 4
H. 2. j

THE GIFT OF

Asa Gray.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1880.

LIBRARY OF THE GRAY HERBARIUM

HARVARD UNIVERSITY

LIST OF PLANTS

FOUND ON THE

PLAINS OF WESTERN DAKOTA AND EASTERN MONTANA

DURING THE

SUMMER OF 1877 AND SPRING OF 1879,

BY

V. H A V A R D ,

ASSISTANT SURGEON, U. S. A.;

BEING PART OF

APPENDIX SS

OF THE

ANNUAL REPORT OF THE CHIEF OF ENGINEERS FOR 1880.

HARVARD UNIVERSITY HERBARIUM.

THE GIFT OF

Aa Gray.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1880.

LIST OF PLANTS

FOUND ON THE

PLAINS OF WESTERN DAKOTA AND EASTERN MONTANA DURING THE SUMMER OF 1877 AND SPRING OF 1879.

BY V. HAVARD, ASSISTANT SURGEON, U. S. A.

This list contains 375 species, 62 of which are woody, and 313 herbaceous.

The country which it covers and characterizes may be defined as the Northwestern plains, including the northwestern quarter of Dakota and that portion of Montana lying east of the Rocky Mountains. The main streams watering it are the Upper Missouri, from Fort A. Lincoln to the Falls, the Yellowstone from its mouth to the Cañon, the Musselshell, and Milk River up to the boundary line.

The Northwestern plains are mostly underlaid by cretaceous or lignite tertiary beds. They are generally rolling, often broken into buttes and bad lands, and as their name implies, without mountain ranges. Their soil is sandy alluvial, more or less alkali in bottoms and bad lands, and gravelly on table-lands. In altitude they range from 1,640 feet at Bismarck to about 3,000 at Benton. Their great meteorological features are long and severe winter and smallness of rainfall.

This paper is complementary to the "Botanical Outlines," published in Appendix Q Q of the Report of the Chief of Engineers for 1878; it is a study of the same subject, but under quite different aspects. It contains the enumeration *in extenso* of all the plants seen in the region whose flora was merely sketched in the "Outlines." Some repetition was unavoidable; the trees and shrubs, specially described in the latter paper, necessarily reappear in this but mostly shorn of all details already published.

The plants of this list were observed or collected during the summer of 1877, while serving with the Seventh United States Cavalry, and during the spring of 1879, while accompanying the Eighteenth United States Infantry to Fort Assinaboine, Mont. They are arranged by families in the order of Gray's Manual. The state of the plant with regard to its flower or fruit is generally stated; if found in flower, the date of collection or period of blossoming simply appears without remark.

To Mr. Sereno Watson, of Cambridge, for his assistance in determining many species, and other courtesies, I feel under great obligations.

With a view to exhibit clearly the range of woody, and that of a few attractive herbaceous species, I shall trace them along the Missouri and its principal tributaries, so as to present, as it were, the botanical physiognomy of those streams. This will also have the advantage to bring the subject within the easy understanding of those not specially interested in botany.

Missouri.

At Fort A. Lincoln, our starting point, the valley of the Missouri is wide and covered with forests of cottonwood; willow thickets line the shores. At intervals, on dry ground, are small groves of elm, box-elder, and ash. On higher grounds, along the bluffs, are a few oak. The bullberry, osier-dogwood, rosebush, and snowberry abound. The Missouri currant, prickly gooseberry, and choke-cherry are also common. The following vines are frequently seen: Virgin's bower, winter grape, and poison ivy; less common are the Virginian creeper and the hop, and rare is the climbing bittersweet. On the slopes and covering the top of the bluffs are seen brown and green patches of ground cedar. The red cedar begins to appear on the bluffs above the Little Missouri, and is common thence.

These general features are preserved until the mouth of the Yellowstone is passed; then the Missouri narrows perceptibly, and the large tracts of cottonwood become much reduced. The oak has disappeared, the elm grows scarce, and will also soon disappear. Ash, nowhere common, decreases above the Yellowstone; sparse groves, far-

ther between above Peck; are seen as far as Carroll. Box-elder is now more common, extending up ravines with clumps of ash.

Poilar Creek is well timbered with cottonwood, willow-leaved poplar, ash, and box-elder.

Above Wolf Creek is first noticed the characteristic sage brush of the Missouri and Yellowstone (*Artemesia cana*).

Above Peck the river grows still narrower and the bluffs bolder and more precipitous. On their distant summits are seen a few pines (*Pinus ponderosa*), which increase in number and size as we proceed farther up. First seen on the tops in the early morning from the steamboat deck, they gradually descend down the slope as we advance, and late in the evening have reached the river bank in the vicinity of Fort Hawley. The red cedar has now disappeared from the bluffs, and near the mouth of the Musselshell is seen on the shore in the strange company of cottonwood and willows; it becomes scant above Armell's Creek.

Above Carroll timber grows scarce in the contracted valley; long reaches of river without cottonwood are passed. Steamboats now take in pine and cedar for fuel. Above Cow Island the river runs between bare buttes worn into fantastic shapes. The scant fuel costs twice as much as below the Musselshell. Little clumps of cottonwood and willows appear here and there, on the edge of the valley, at the mouth of a tributary, or again on an island. With those exceptions the Missouri is mostly destitute of arborescent vegetation, and remains so as far as the Falls and probably much beyond. Between the Coal Banks and Benton small groves of box-elder are seen scattered on the shores.

After passing the Marais River, first appear the two poplars which, from their constant association, may be called companion poplars (balsam poplar and willow-leaved poplar), mixed with cottonwood. The latter grows scarce; only a few are seen above Benton, and at the Falls has completely disappeared, being superseded by the two former.

There is no timber at Benton, nothing but willow brush along the banks and a few half-grown cottonwood in the distance. The same destitution continues above Benton where the banks soon narrow into a rocky cañon.

At the Falls I noticed several clumps of balsam and willow-leaved poplar, box-elder, red cedar; on the declivity of the banks, choke-cherry, prickly gooseberry, and rosebush. No pine was seen either on the banks or the grassy plains above.

Yellowstone.

The flora of the Lower Yellowstone does not materially differ from that of the Missouri. The valley rising soon to a higher level, the soil being less alluvial and more gravelly, and the temperature distinctly higher, we find, in consequence, a greater variety of species.

The arborescent vegetation, however, remains about the same. The cottonwood and willows continue to be the prevalent timber. Elm, scant near the mouth, soon disappears. Sparse groves of ash are found above Tongue River.

Many showy flowers deck the valley and the slopes in the spring: *Leucocrinum Montanum*, *Penstemon acuminatum* and *album*, *Gaura coccinea*, *Oxytropis Lamberti*, and *Campestris*, *Lupinus perrennis*, and various astragali, &c. Above Cedar Creek blossom early the two elegant species of *Fritillaria* (*atropurpurea* and *pudica*), two of *Zigadenum* (*Nuttallii* and *paniculatus*), and, somewhat later, the sega-plant (*Colochortus Nuttallii*) and several species of *Ænothera*, principally the *pinnatifida* and *coespitosa*. All bottoms are covered with white sage-brush (*Artemesia cana*). On the bluffs is commonly seen the *Yucca Augustifolia*.

After reaching Custer Creek new shrubs attract attention; the western sage-brush (*Artemesia tridentata* and occasionally the *trifida*), and the grease-bush (*Sarcobatus vermiculatus*) which flourishes on bad-lands. Now also abounds the notorious gramen, porcupine or spear-grass (*Stipa comata*), whose barbed seeds in August adhere obstinately to man and horse alike. More noisome still is the ubiquitous Missouri cactus.

The ground cedar is common but the red cedar is rarely seen east of Tongue River; thence common. The choke-cherry, rosebush, bullberry, hop, and several gooseberries are found mostly everywhere. The bluff pine is first seen on the hills of Porcupine Creek; thence common. The cottonwood, above Clarke's Fork becomes mixed with the companion poplars; it is mostly replaced by the latter at the mouth of the Big Rosebud, and disappears a short distance further up. Above Clarke's Fork, box-elder is a common tree on the valley.

The Yellowstone is well timbered in its lower and upper portions, but the middle portion is occasionally bare. It is nowhere, below the cañon, contracted like the Upper Missouri, or, like it above Carroll, destitute for many miles of arborescent vegetation.

The Lower Yellowstone, from its mouth to Glendive Creek, and the Upper Yellowstone, from Tongue River upward, seem to possess great advantages as farming districts, having a good soil, temperate climate, and unbounded facilities for raising stock.

The tributaries of the Yellowstone, east of the mountains, are mostly timbered with cottonwood as far as Clarke's Fork; above that stream the companion poplars supersede it. Box-elder in small groves, aspen and western alder in thin clumps grow on Clarke's Fork a few miles above its mouth; on the Big Rosebud pine is added to these.

Musselshell.

On the Musselshell cottonwood is the prevalent tree; at the bend it becomes mixed with balsam and willow-leaved poplars and disappears a short distance above Colonel Stanley's crossing. Choke-cherry and Missouri currant are abundant.

Judith Basin.

In the Judith Basin the bluff-pine covers the hills. Aspen, the companion poplars, willows, and the western birch, grow on the banks of streams.

Milk River.

On Milk River the timber consists essentially of cottonwood and willows as far as the boundary line. Cottonwood extends likewise into its tributaries, but only for a short distance, being soon replaced by the companion poplars. On many of these tributaries, north and south, box-elder is the prevalent tree and has given its name to several of them.

On the Marais and Teton Rivers, both fairly timbered, the companion poplars preponderate and supply most of the lumber and fuel procurable at or above Benton.

TEMPERATURE AND RAINFALL.

With the hope to enable the reader to form a more intelligent conception of the agricultural capabilities of this region, I have, as far as imperfect statistics would allow me, computed its temperature and rainfall.

The results obtained, in their general bearing, are not new, and make no claim to originality; they confirm what I believe, already accepted principles in climatology and illustrate these principles in their application to this limited zone. In a more particular way they permit me to point out several local influences and variations which may add to our knowledge of the meteorological peculiarities of the northern plains.

Temperature.

It is known that on the same parallel the mean annual temperature presents sensible variations which are, to a certain extent, independent of altitude or other local causes. The 47th degree of latitude, being that of the Northern Pacific Railroad, and nearly the central line of the Dakota plains, was the one selected for my inquiries. I found that, on that parallel, the lowest temperature is on or near the Mississippi Valley, and the highest on the Pacific Coast; the extremes being $34^{\circ}.5$ on the meridian of Fort Ripley, Minn., and $52^{\circ}.2$ on that of Fort Lapwai, Idaho.

In the following figures, whenever any stated place is not on or near the 47th degree, an approximate correction is made for difference of latitude on the basis of $1^{\circ}.5$ Fahr. for each degree of latitude; in other words, unless otherwise stated, the temperature is for the meridian of that place where it crosses the 47th degree.

Starting from Chatham, N. B., with a mean of 39° , the temperature increases slightly as we remove from the coast, being $40^{\circ}.6$ at Quebec. It remains about the same across the lakes as far as Duluth, viz.: Alpena, Mich., 40° ; Fort Brady, Mich., $39^{\circ}.7$; Marquette, Mich., 42° ; Duluth, Minn., 41° . These figures seem to denote a slight rise along the western half of Lake Superior. From Duluth the mean temperature falls rapidly, and reaches its minimum near the Mississippi Valley; thus the meridian of Fort Ripley, Minn., on the 47th degree (mean of three years) is only $34^{\circ}.5$. Farther south the minimum mean is thrown farther west, as seems to be shown by the corrected temperatures of Saint Paul ($39^{\circ}.9$) and Fort Wadsworth, Dak. ($36^{\circ}.7$); so that the minimum line may be drawn obliquely from Brainerd to the headwaters of the Minnesota River. From the minimum line, westward, a steady though irregular increase is noticed; this increase is $5^{\circ}.1$ from Ripley to Bismarck, and $6^{\circ}.3$ from Wadsworth to Fort Sully, Dak. The following table of mean temperatures, corrected for latitude, is introduced for reference. The places enumerated are arranged in the order of their longitude:

Fargo, Dak	37.2
Wadsworth, Dak	36.7
Jamestown, Dak	37.5
Bismarck, Dak	39.6
Fort Stevenson, Dak	39.2
Fort Buford, Dak	39.5
Fort Keogh, Mont	46.5
Fort Benton, Mont	45.4

Fort Shaw, Mont.	45.5
Fort Baker, Mont	38.2
Fort Ellis, Mont	38.1
Fort Lapwai, Idaho	52.2
Fort Colville, Wash	48.4
Olympia, Wash	51.3
Cape Disappointment, Wash	50.0

The mean of Bismarck is slightly above that of the same parallel for a considerable distance west and east of it; on the Missouri it is only reached again above Fort Buford, but on the Yellowstone the temperature rises at a much more rapid rate and is $47^{\circ}.2$ at the mouth of Tongue River (Fort Keogh), so that it is probable that the increase from Bismarck overland to Keogh is immediate and constant.

The difference between the temperature of the Lakes and that of the Mississippi Valley is shown again by comparing the actual mean of Marquette and Duluth with that of Saint Paul; though the latter town is nearly 2° south of the former two, its mean ($42^{\circ}.9$) is only $0^{\circ}.1$ higher than that of Marquette ($42^{\circ}.8$) and $1^{\circ}.5$ higher than that of Duluth ($41^{\circ}.4$), while in the latter case it should be at least 3° .

The general rise of the thermometer as we advance west of the Mississippi is also well established by comparing the actual means of Saint Paul ($42^{\circ}.9$) and Fort Sully, Dak. (47°), both places being very nearly on the same latitude.

From Buford the rise is rapid and striking to Benton and Fort Shaw. The fall noticed for Baker and Ellis is only apparent; these two posts being at an elevation of about 6,000 feet above sea level, a correction for altitude would raise their mean to at least that of Shaw whose altitude is only 3,000 feet.

Beyond the Mountains the mean is much higher and reaches its maximum on the meridian of Fort Lapwai. Thence to the coast (mouth of the Columbia River) there seems to be a slight decline.

The mean of the forty-seventh parallel, at least east of the Rocky Mountains, is low, not from the moderate temperature of the summer, which is generally hot and dry, but from the excessive cold of the winter which, from October to April, holds land and water fast in its icy bounds. The gradual rise noticed west of the minimum line, but specially west of the Buford meridian, is due, not so much to any increase of summer heat as to that of the winter, rendering the temperature, *pro tanto*, more equable and, therefore, the climate more desirable. Thus the difference between the summer means of Rice and Benton (uncorrected for latitude) is only $0^{\circ}.25$ in favor of Benton, while the difference between the winter means of those two posts is $2^{\circ}.5$ likewise in favor of Benton. A correct way to express the relation of the winter temperature to that of the whole year would be to divide the annual by the winter mean; the higher the latter, of course the smaller the quotient, that is to say, the more even and temperate the climate. Thus, comparing Fort Snelling, Minn., with Fort Sully, Dak., two posts on the same latitude, we obtain $1^{\circ}.97$ for the former and $1^{\circ}.74$ for the latter, the actual difference between the winter means being 5° .

The results obtained for other posts (uncorrected for latitude) are as follows:

Fort Ripley	2.38
Fort Seward	2.27
Fort Lincoln	1.83
Fort Keogh	1.56
Fort Benton	1.66
Fort Shaw	1.35

They show clearly in what proportion the winter grows milder as we advance west; they also show that the winter of Keogh is much milder than that of corresponding points on the Missouri.

The foregoing statistics are confirmed by observing the different stages of the vegetation along the Missouri in various places at about the same time. The milder the winter, of course, the earlier will appear the evidences of coming spring, in other words, the more advanced will be the vegetation; this, in a country where the farmer must plant and reap early to avoid the heat and drought of summer, is an important point. The following notes taken this spring, although very incomplete, bear out and illustrate meteorological observations. They tend to show, however, what I believe is true, that the vegetation at Buford is at least as forward as at Lincoln and not behind it as the difference between the winter means would lead us to expect.

April 16, Brainard.—Ice on the ponds.

April 16, Morehead.—New grass hardly perceptible; one solitary plant in bloom—*Anemone patens*.

April 17, Bismarck.—White frost on the grass.

April 18, Missouri River.—Elm in blossom; not yet leafing.

April 20, above Berthold.—Two umbelliferæ opening their blossoms—*Peucedanum macrocarpum* and *Cymopterus glomeratus*.

April 24, above Buford.—Perceptible advance in vegetation over that of the previ-

ous few days; willow buds bursting and bullberry bushes turning yellow; banks now covered with green grass.

April 26, Wolf Creek.—Willow, bullberry, and prickly gooseberry in full bloom.

April 29, Peck.—Cottonwood leafing.

May 1, Carroll.—Strawberry in bloom; cottonwood with full-grown foliage.

May 2, above Cow Island.—Several flowers first seen on shore: *Fritillaria*, *Dodecatheon*, *Thermopsis*, *Viola*, &c.

May 4, Coal Banks.—Quite a number of new species in blossom: *Pentstemon*, *Astragalus*, *Phlox*, *Oxytropis*, *Comandra*, *Ranex*, *Allium*, &c.

May 29, Falls of the Missouri.—Vegetation distinctly more advanced than at Coal Banks and Fort Assinaboine, left on previous day. Rosebush first seen in blossom; *Ceanothusa cespitosa* and *Gaura coccinea* also in flower, as well as several composite species.

What has been said of the Missouri and Yellowstone will apply to the plains north of the former river, even to the Saskatchewan region. In the able report of G. M. Dawson on the geology of the forty-ninth parallel, it is shown that the indications of the advance of the season on the Red River (97° longitude), where it intersects the forty-ninth parallel, coincide with those of Cumberland House (latitude 54° , longitude $102^{\circ}.20$), which lies over 300 miles farther north. At Carleton House (latitude 52° , longitude $106^{\circ}.15$) the spring is a week in advance of that in the Red River Valley. At Fort Edmonton (latitude $53^{\circ}.31$, longitude $113^{\circ}.17$), in the foothills of the Rocky Mountains, the spring is also a few days earlier than in the Red River Valley.

The influence of latitude on the early development of plants seems specially perceptible in this zone. Traveling up the Red River from Pembina to Fargo, in May, 1876, I noticed hourly the manifest progress of the vegetation along the banks. I estimated that the advance of Fargo over Pembina was not less than two weeks, or about one week for each degree of latitude, the mean annual rise of temperature for the same distance being 3° , or $1^{\circ}.5$ Fahr. per degree of latitude.

The annual means of Fargo and Benton (uncorrected) are respectively $37^{\circ}.2$ and $44^{\circ}.4$, a difference of $7^{\circ}.2$. Assuming, as we may, that the vegetation between those two points is affected by increased temperature in about the same ratio as between Pembina and Fargo, it follows that Benton is more than a month in advance of Fargo, a fact made manifest not at Benton itself, which is destitute of tillable lands, but on the beautiful prairies which extend thence to the mountains. Over these prairies large herds of cattle roam in complete freedom summer and winter, and by their rapid increase prove the adaptability of land and climate to the successful raising of stock.

Before closing these remarks on temperature I wish to notice an interesting application of a well-known meteorological law. It has been ascertained that the loss of heat by radiation, specially nocturnal radiation, is greater near the ground than at a certain elevation; in other words, we find that within a limited altitude the temperature of the air increases as we rise above the earth's surface. Thus, if two thermometers, placed one on the ground and the other at a height of 150 feet, be read at the same time, the latter would be 12° higher than the former. This increase is noticeable to a height of at least 200 feet. Beyond it, temperature declines with altitude.

In accordance to this law, everybody on the plains may have observed in the early spring that vegetation is more advanced on the slopes and ridges than on bottom lands and low prairies. On high grounds the earliest flowers are found. The farmers on the eastern base of Pembina Mountain begin plowing and sowing at least ten days before those of the Red River Valley. I have also been much annoyed by mosquitoes in May on buttes, when none were seen a few hundred feet away in the low valley. This law, applicable to the surface accidents of one locality, has, if any, but a very limited influence upon the rise of temperature westward on the same parallel.

Rainfall.

On large, level areas, stripped of forests, the rainfall is generally small and subjected to many variations which render statistics difficult of interpretation. For instance, at Fort Buford the fall for the year 1872-73 was more than double that of previous and subsequent years; again, at Fort Benton the mean for the four years ending June, 1874, is 11.42 inches, while that for the three years ending December, 1878, is 17.61 inches. A mean of many years would be required to arrive at correct results. In the absence of sufficient data I can only aim at relative accuracy.

The necessary amount of rain which will enable farmers to raise profitable crops, without irrigation or heavy dews, on fair soil, can be set down at 35 inches, the average of Ohio and Illinois. The mean average of this region is very small, probably not over 15 inches. This small amount, in spite of many fertile valleys and rich prairie lands, will, I fear, always condemn it to the comparative sterility of the Great American Desert.

By comparing observations as near as possible for the same period of years, it is pretty well established that the fall of rain lessens as we proceed westward from the lakes. At Duluth, Minn., it is only 32.2 inches. It does not sensibly decline in wooded

districts as far as the Mississippi; thus, it is 33 inches at Brainerd and 28 inches at Saint Paul.

Forest lands end at Detroit, Minn., on the Northern Pacific Railroad, and there the treeless plains may be said to begin. Thereafter arboreal vegetation is limited to the shores of streams and to mountains, and rainfall decreases correspondingly with it.

From the Mississippi to the Red River the decline is quite perceptible: Fargo, 21.5. Wadsworth, 24, and continues to the Missouri: Jamestown, 18.5, Totten, 16.7. On the Missouri and westward to the Rocky Mountains the mean is still lower, and apparently quite insufficient for remunerative farming, as the table exhibits:

	Inches.
Fort Lincoln, Dak.....	15
Fort Rice, Dak.....	12
Fort Sully, Dak.....	16.4
Fort Stevenson, Dak.....	13
Fort Buford, Dak.....	12
Fort Benton, Mont.....	11.4
Fort Keogh, Mont.....	13
Fort Shaw, Mont.....	6.7
Fort Baker, Mont.....	9.6
Fort Ellis, Mont.....	16
Fort Lapwai, Idaho.....	14.6
Cape Disappointment, Wash.....	56.6

It seems that, in a general way, the rainfall grows smaller as we near the Rocky Mountains. It does not increase much, if any, in Idaho, but becomes very large on the Pacific coast. I have ascertained, though without direct statistics, that the precipitation on the Yellowstone is materially larger than on the Missouri for the same meridian.

A small fall equally distributed throughout the year would be of little benefit to the farmer; fortunately for this region, the rain falls mostly in the spring and early summer, from April to July, so as to concentrate its beneficial effects to the season of growth. From Duluth to the Missouri, May, June, and July are the rainy months: west of the Missouri the rainy season is a little earlier, May being the month of greatest precipitation; west of the Mountains it is earlier still.

In this region of sandy, porous soil, a few inches of rain are far more precious than a few degrees of heat, and we find the most remunerative crops there where the precipitation is largest, viz, east of the Missouri. There is a striking difference in the flora of the two sides of the Missouri where it is crossed by the Northern Pacific Railroad. On the eastern shore the cottonwood disappears; the prairie wears a new aspect, caused by a greater variety of non-gramineous plants and the absence of Buffalo-Grass.

On James River the timber is mostly elm and box-elder; on the Red River, oak, ash, elm, aspen, and box-elder. No cottonwood grows on either of these streams.

East of Jamestown the soil is more substantial, and the rain, though not averaging 20 inches, falling when most needed, seems sufficient to raise good crops. In the last three or four years the Northern Pacific Railroad, between Jamestown and Red River, has become lined on both sides with flourishing villages where excellent wheat is raised on extensive tracts of prairie lands.

It is noteworthy that the rainfall has much increased of late over the whole Missouri Basin, and great encouragement thereby given to settlers. I am unable to explain this increased precipitation; being very general it cannot be due to the cultivation of very limited areas in Dakota and Montana; I fear it does not depend upon permanent causes, and that the last few years of relative abundance will be followed by a period of drought and sterility.

RANUNCULACEÆ.

(Crowfoot family.)

Ranunculus aquatilis, L. (White Water Crowfoot).—Middle Yellowstone; common in swamps; July.

R. Pensylvanicus, L. (Bristly Crowfoot).—Cedar Creek; Crow Agency; July and August.

R. abortivus, L. (Small-flowered Crowfoot).—Tributaries of Middle Yellowstone.

R. Cymbalaria, Purch. (Seaside Crowfoot).—Tributaries of Middle Yellowstone; Milk River; May.

Clematis ligustifolia, Nutt. (Western Virgins' Bower).—Missouri; Cedar Creek; Mouth of Big Horn; Big Rosebud; July.

C. ligusticifolia, var. *brevifolia*, T. and G.—Pompey's Pillar. August, in fruit.

Anemone patens, L., var. *Nuttalliana*, Gr. (Pasque-Flower).—Common on the Northern Pacific Railroad; first seen in blossom on April 15; the earlier flower on the prairies; sparse from Fort Lincoln to Fort Buford; May.

A. Virginiana, L. (Virginian Anemone).—Shoshonee Mountains. September, past flowering.

A. cylindrica, Gr. (Long-fruited Anemone).—Cedar Creek, July; Crow Agency, August, in fruit.

A. multifida, D. C. (Many-cleft Anemone).—Judith Basin; September, in seed.

A. Pensylvanica, L. (Pensylvanian Anemone).—Missouri River, near Buford, June. *Thalictrum purpurascens*, L. (Purplish Meadow Rue).—Cedar Creek, July; Fort Assinaboine, May.

Delphinium exaltatum, Ait. (Tall Larkspur).—Foot of Shoshonee Mountains. September in flower and fruit.

D. Menziesii, D. C.—Cedar Creek. June.

D. bicolor, Nutt. Upper Missouri and Milk River. May.

PAPAVERACEÆ

(Poppy Family.)

Argemone hispida, Gr. Near Porcupine Creek in gravelly plain. August Handsome, showy, white petals.

CRUCIFERÆ.

(Mustard Family.)

Sisymbrium canescens, Nutt (Tansy Mustard).—Very common on the plains; Milk River.

S. linifolium (*S. junceum*, Bieb).—Sandy Bluffs of Cedar Creek. July.

Arabis Drummondii, Gr.—Meadows of Middle Yellowstone; May.

A. Halbaellii.—Middle Yellowstone; Missouri Falls; May.

Vesicaria alpina (Dwarf Bladder-pod).—Common on prairies about Fort Berthold; May.

V. Ludoviciana, D. C.—Upper Missouri; Missouri Falls; May.

Draba caroliniana, Walt.—Sunday Creek; July, seeds shedding.

D. nemorosa, L.—Fort Assinaboine and Milk River; May.

Lepidium intermedium, Gr.—Very common on low prairies; Missouri; Cedar and Sunday Creeks.

Erysimum parviflorum, Nutt.—Missouri Falls. May, first blossoms.

E. asperum, D. C. var. *Arkansanum*, Nutt (Western Wall-flower).—Sunday Creek, June; prairies of Milk River, May.

Nasturtium palustre, D. C. (March Cress).—Crow Agency; August.

Barbarea vulgaris, R. Br. (Common Winter Cress).—Middle Yellowstone.

Stanleya pinnatifida, Nutt.—Bluffs of Cedar Creek, July. Rare.

Thelypodium integrifolium, Endl.—Clark's Fork. September 1, in flower.

CAPPARIDACEÆ.

(Caper Family.)

Cleome integrifolia, T. and G.—Common on bad-lands of Sunday Creek, July, and bottom lands of Clarke's Fork. September, in fruit.

Polanisia trachysperma, T. and G.—On bad-lands of Sunday Creek, July. Much rarer than preceding.

VIOLACEÆ.

(Violet Family.)

Viola Canadensis, L. (Canada Violet).—Lower Yellowstone, June; Milk River and Fort Assinaboine, May.

V. Nuttallii, Pursh.—Missouri bottom, near Fort Buford; Bluffs of Upper Missouri. One variety, with cordate leaves, like the venosa of S. Watson, near Benton. May.

HYPERICACEÆ.

(St. John's-wort Family.)

Hypericum Canadense, L. (Canada St. John's wort).—Crow Agency; August.

CARYOPHYLLACEÆ.

(Pink Family.)

Cerastium arvense, L. (Field Chickweed).—Common on Yellowstone, Milk River, and Fort Assinaboine. May.

C. alpinum, var. *Behringianum*.—Upper Yellowstone.

Arenaria congesta, Nutt. var. *sub congesta*, Watson.—High prairies of Milk River
May.

A. Capillaris.—Middle Yellowstone.

Silene Menziesii, Hook.—Clark's Fork; Milk River.

Lychnis Drummondii, Watson.—Banks of Big Rosebud. August 30, flowers fading.

MALVACEÆ.

(Mallow Family.)

Malvastrum coccineum, Gr. (False Mallow).—Very common on the plains of the Middle Yellowstone; opens in June its showy, pink flowers.

LINACEÆ.

(Flax Family.)

Linum perenne, L. (Wild Flax).—Abounds on sandy, gravelly plains and ridges of the Yellowstone and its tributaries. Blossoms in June.

L. rigidum, Pursh.—Also very common on sandy plains of Yellowstone. Blossoms in June and July.

L. —.—Rarer form than preceding, but found in some localities, somewhat larger and more spreading. Stem more slender; leaves rigid, more strictly linear. Styles divided to the middle and divergent. Flowers appearing successively, only 1 to 2 at a time, large, 1' in diameter. Petals not spotted at base, mucronate. Possibly only a variety of the preceding.

GERANIACEÆ.

(Geranium Family.)

Geranium incisum.—Banks of Big Rosebud; August, past flowering.

ANACARDIACEÆ.

(Sumach Family.)

Rhus toxicodendron, L. (Poison Ivy).—Missouri, Musselshell, Sunday Creek, Fort Assinaboine; July.

R. aromatica, var. *trilobata*, Gr. (Fragrant Sumach).—First seen on Cedar Creek, thence common north and west on rocky bluffs. Fort Assinaboine.

VITACEÆ.

(Vine Family.)

Vitis cordifolia, Michx. (Winter or Frost Grape).—Missouri Valley, common; Yellowstone, at mouth of Big Horn.

Ampelopsis quinquefolia, Michx. (Virginian Creeper).—Missouri Valley, uncommon.

CELASTRACEÆ.

(Staff-tree Family.)

Celastrus scandens, L. (Climbing Bitter-Sweet).—Missouri, at Fort Lincoln and near Fort Buford.

ACERINEÆ.

(Maple Family.)

Megundo aceroides, Moench (Ash-leaved Maple—Box-Elder).—Common on the tributaries of the Missouri, Yellowstone, and Milk Rivers. The prevalent tree on Beaver and Box-elder Creeks and other tributaries of Milk River.

POLYGALACEÆ.

(Milkwort Family.)

Polygala alba.—Custer Creek, June. Common on the lower prairies.

LEGUMINOSÆ.

(Pulse Family.)

Lupinus perennis, L. (Wild Lupine).—Lower Yellowstone, May.

L. pusillus, Pursh.—Sandy ridges of Sunday Creek, July.

L. Argentens, Pursh.—Headwaters of Clark's Fork, at the foot of mountains; September; a large and handsome species.

L. Ornatus, Dougl.—Gravelly bluffs of Sunday Creek, July 1; in flower and seed.

Pisoralea esculenta, Pursh. (*Pomme de prairie*; Prairie Turnip).—Found sparsely on all sandy plateaus. Sunday Creek, June. Edible farinaceous root.

- P. argophylla*, Pursh.—Cedar Creek; July.
P. floribunda, Nutt.—Cedar Creek; July.
P. lanceolata, Pursh.—Porcupine Creek, August, in blossom and fruit.
Petalostemon violaceus, Michx. (Red Prairie Clover).—Sunday Creek, July. Common.
P. violaceus, var. *mollis*, Gr.—New variety. Stems and leaves clothed with soft, silky pubescence. Willow Creek (between Yellowstone and Musselshell Rivers), August 22.
P. candidus, Michx.—Clark's Fork, September 1.
Glycyrrhiza lepidota, Nutt. (Wild Liquorice).—Abounding on bottom-lands and gravelly plains. One of the most common weeds of this region. Blossoms in July.
Astragalus Canadensis, L. (Canada Milk-Vetch).—Crow Agency, August.
A. caryocarpus, Ker. (Ground Plum).—Common on dry, sandy plateaus. Blossoms early in May. Fleshy pods grown and edible in July.
A. triphyllus, Pursh.—Common on prairies of the Middle Yellowstone and Upper Missouri. Pretty species blossoming in June.
A. pectinatus, Dougl.—Bluffs of Sunday Creek.
A. flexuosus, Dougl.—Prairies and bluffs of Middle Yellowstone.
A. multiflorus, Gr.—Prairies and bluffs of Middle Yellowstone.
A. adsurgens, Pall.—Prairies and bluffs of Middle Yellowstone.
A. Missouriensis, Nutt.—Prairies and bluffs of Middle Yellowstone.
A. bisulcatus, Gr.—Prairies and bluffs of Middle Yellowstone.
A. Purshii, Dougl.—Prairies and bluffs of Middle Yellowstone.
A. Drummondii, Dougl.—Prairies and bluffs of Middle Yellowstone.
A. Kentrophyta, Gr.—Prairies and bluffs of Middle Yellowstone.
A. Caespitosus, Fr.—Prairies and bluffs of Middle Yellowstone.
Oxytropis Lamberti, Pursh.—Common on bluffs of Middle Yellowstone. Showy, variable species, blossoming in June and July.
O. campestris, L.—Yellowstone. Bluffs of Upper Missouri, May. One of the earliest showy plants of the family.
Hedysarum Mackenzianum, Rich.—Cedar Creek, July 12; in flower and seed.
H. Mackenzii, var. *canescens*, Gr.—Cedar Creek, July 12; in flower and seed.
Vicia Americana, Muhl.—Common on banks and prairies of Missouri and Milk River.
Var. *linearis*, Banks of Upper Missouri.
Lathyrus ornatus, Nutt.—Missouri bottom at Fort Buford.
Thermopsis rhombifolia, Nutt.—Missouri bottom and Lower Yellowstone. Showy yellow flowers, opening early in May.
Hosackia Purshiana, Benth.—Missouri, near Fort Berthold, November; seed shedding.
Amphicarpa monoica, Nutt. (Hog Pea Nut).—Banks of Missouri, near Buford, June.
- ROSACEÆ.
(Rose Family.)
- Prunus Virginiana*, L. (Choke-Cherry).—Common in the Missouri Valley as far as the falls, and on the Yellowstone west and north of Cedar Creek. Blossoms in May; fruit ripe in August.
Agrimonia Eupatoria, L. (Common Agrimony).—Cedar Creek, June.
Geum album, Gmelin (White Avens).—Cedar Creek, July; Big Rosebud, August.
G. macrophyllum, Willd.—Cedar Creek, July.
G. triflorum, Pursh.—Shoshone Mountains, September, past flowering; Milk River, July.
Potentilla fruticosa, L. (Shrubby Cinque-foil).—Shoshone Mountains and Judith basin, September.
P. Noevigica, L.—Cedar Creek, July.
P. Pensylvanica, L.—Yellowstone, May, July.
P. gracilis, Dougl.—Cedar Creek, July.
P. gracilis, var. *rigida*, Watson.—Cedar Creek, July.
P. paradoxa, Nutt.—Cedar Creek, July.
P. anserina, L. (Silver Weed).—Fort Assinaboine, May.
Fragaria Virginiana, Ehrhart (Strawberry).—Scattered in valley of Upper Missouri; Carroll, May.
Crataegus tomentosa, L., var. *mollis*, Gr. (Black or Pear Thorn).—Missouri Valley and Fort Buford, May.
C. Douglasii, Lind.—Cedar Creek, July; Judith Basin, September; in fruit. Edible, punctated berry.
Amelanchier Canadensis, T. and G. (June-Berry; Pemmican-Berry).—Sparse on the Missouri (var. *rotundifolia*, Gr.). Headwaters of Cedar Creek, July; fruit nearly ripe. Edible berry; sometimes an ingredient of pemmican.
Rosa blanda, Ait. (Early Wild Rose).—Abounds on all bottoms. Very variable; probably several varieties; needs revision.
Heuchera parviflora, Nutt. (Alum-Root).—Bluffs of Milk River, May.

SAXIFRAGACEÆ.

(Saxifrage Family.)

Ribes floridum, L. (Wild Black-Currant).—Cedar Creek; Crow Agency; August; fruit ripening.

R. lacustre, Poir.—Cedar Creek, June; Musselshell, August; in fruit.

R. setosum, Dougl. (Prickly Gooseberry).—The prevalent gooseberry on the Upper Missouri; blossoms in April, fruit ripe in June; Milk River.

R. aureum, Pursh. (Missouri Currant).—Cedar Creek; Musselshell, August; fruit ripening.

R. cereum, Dougl.—Shoshone Mountains, September; Little Rocky Mountains, October; in fruit; Milk River.

R. irriguum, Dougl.—Foot-hills of Shoshone Mountains, September 10; berries ripe and very palatable.

Parnassia palustris, L.—Clarke's Fort Cañon, September; past flowering.

GRASSULACEÆ.

(Orpine Family.)

Sedum Stenopetalum, Pursh.—Shoshone Mountains, September.

ONAGRACEÆ.

(Evening-Primrose Family.)

Oenothera biennis, L. (Common Evening Primrose).—Common; Cedar Creek, July.

O. albicaulis, Nutt.—Open prairie, sparse from the Muscle shell to Fort Lincoln.

O. pinnatifida, Nutt.—The most common as well as the most showy *Oe.* of this region. Alkali bottoms, sandy ridges, bad-lands. Radical leaves tapering into long petioles; stigmas much shorter than the versatile anthers; capsules 1½ inches long; seeds 2-rowed in each cell, fusiform, ½ to 1 line long, minutely reticulated. Blossoms in June and July.

O. cespitosa, Nutt.—Common in gravelly buttes and bad-lands. Sunday Creek, July; Milk River, May.

O. serrulata, Nutt.—Rocky Bluffs. Head of Sunday Creek, June.

Epilobium angustifolium, L. (Great Willow-Herb).—Head of Cedar Creek, July; Willow Creek (north tributary of Yellowstone), August.

E. coloratum, Muhl.—Willow Creek, August.

E. paniculatum, Nutt.—Willow Creek, August 22; in flower and seed.

Gaura coccinea, Nutt.—Common on Cedar Creek, and other tributaries of the Middle Yellowstone. Blossoms in June.

G. parviflora, Dougl.—Pompey's Pillar, August; mouth of Big Horn, August; flower and seed.

LOASACEÆ

(Loasa Family.)

Mentzelia laevicaulis, T. and G.—Near Pompey's Pillar, August 13; near Fort Buford November 1, in seed; stem and leaves rough-scabrous, viscid-sticky; petals, 5, deep sulphur-yellow, 2 to 3 inches long. Bracteoles inserted in calyx-tube, pinnatifid, seeds in 3 rows (16 in each row), winged.

M. nuda, T. and G.—Bluffs at the mouth of Sunday Creek, August 1; showy plant.

CACTACEÆ.

(Cactus Family.)

Opuntia Missouriensis, D. C. (Prickly Pear; Missouri Cactus).—Abounds on Middle and Lower Yellowstone. Less common on the Missouri.

* *Mamillaria rivipara*, Haw. (Turk's Head).—Same localities, but less common than the preceding.

CUCURBITACEÆ.

(Gourd Family.)

Echinocystis lobata, T. and G. (Wild Balsam Apple).—Missouri bottom at Fort Stevens, May 10, not yet in flower.

UMBELLIFERÆ.

(Parsley Family.)

Sanicula Marylandica, L. (Maryland Sanicle).—Head of Cedar Creek, July.*Heracleum lanatum*, Michx. (Cow Parsnip).—Head of Cedar Creek, July.*Cicuta maculata*, L. (Spotted Hemlock).—Head of Cedar Creek, July.*Thaspium trifoliatum*, L. (Meadow Parsnip).—Fort Stevenson; Judith Basin, September; in seed.*Bupleurum ranunculoides*.—Missouri Valley.*Musenium divaricatum*, Nutt.—Missouri Valley.*Peucedanum villosum*, Nutt.—Bluffs of Upper Missouri; coal banks; May.*P. macrocarpum*, Nutt.—Upper Missouri Valley; Benton, April and May; generally found in blossom with the next.*Cymopterus glomeratus*, D. C.—One of the earliest flowers of the Middle Yellowstone and Upper Missouri; April and May; common.

CORNACEÆ.

(Dogwood Family.)

Cornus stalonifera, Michx. (Red Osier Dogwood).—Common on bottom lands; July.

CAPRIFOLIACEÆ.

(Honeysuckle Family.)

Symporicarpus occidentalis, K. Brown (Snow Berry).—Abounding in most valleys.*S. vulgaris*, Michx. (Coral Berry).—Cedar Creek, July.*Viburnum lentago*, L. (Sweet Viburnum).—Missouri, at Fort Lincoln, June.

RUBIACEÆ.

(Madder Family.)

Galium boreale, L. (Northern Bedstraw).—Cedar Creek, July.*G. triflorum*, Michx. (Sweet-scented Bedstraw).—Cedar Creek, July.

COMPOSITEÆ.

(Composite Family.)

Achillea millefolium, L. (Common Yarrow or Milfoil).—Very common in valleys and open prairies. Large form, 1°-3° high. Blossoms in July.*Artemesia cana* (White Sage-Brush).—The most common sage-brush of this region.*A. tridentata*, Nutt. (Common Sage-Brush).—Common west of Sunday Creek.*A. trifida*, Nutt.—Found with the latter, but much rarer.*A. frigida*, Willd.—Abundant on gravelly plateaus.*A. biennis*, Willd (Biennial Wormwood).—Very common in valleys.*A. Ludoviciana*, var. *latiloba*, Nutt.—Judith Basin, September.*A. Canadensis*, Michx.—Musselshell River, August.*A. dracunculoides*, Pursh.—Musselshell River, August.*Ambrosia trifida*, L. (Great Ragweed).—Sunday Creek, August; common in valleys.*A. artemisiifolia*, L.—Mouth of Sunday Creek, August.*A. psilostachya*, D. C.—Sandy shores of Sunday Creek, at its mouth, August.*Aster foliatus*, Lindl.—Clark's Fork, September.*A. laris*, L.—Big Rosebud, August.*A. multiflorus*, Ait.—Common; Clark's Fork, September.*Actinella acutis*, Nutt.—Prairies of Upper Missouri and Milk River, May.*A. Richardsonii*, Nutt.—Middle Yellowstone.*Anaphalis margaritacea* (*Antennaria margaritacea*, R. Brown) (Pearly Everlasting).—Big Rosebud, August 20; conspicuous by its corymbed, pearly, white heads.*Balsamorhiza sagittata*, Nutt.—Bluffs of the Musselshell River, August 16; in seed.*Bahia oppositifolia*, T. & G.—Middle Yellowstone.*Bigelowia graveolens*, Gr.—Rocky Fork and Clark's Fork, September 1; in flower. ▲ var. on Clark's Fork with smooth stems and leaves.*Crepis occidentalis*, Nutt.—Middle Yellowstone.*Cirsium undulatum*, Spreng.—Head of Cedar Creek, July 12.*Chrysopsis villosa*, Nutt (Golden Aster).—Big Rosebud, August 29.*C. villosa*, var. *hispida*, Gr.—Big Rosebud, August.*Chaeractis Douglasii*, H. & A.—Missouri Falls, May 30; not yet in blossom.

- Diaperia prolifera*, Nutt.—Bad-lands of Sunday Creek, July.
- Echinacea angustifolia*, D. C. (Purple Cone-Flower).—Common in Missouri Valley, Fort Stevenson and Buford.
- Erigeron glabellum*, Nutt.—Prairies of Milk River, May 26.
- E. strigosum*, Muhl. (Daisy Fleabane).—Var. Middle Yellowstone.
- E. canescens*, Hook.—Missouri Falls, May 30.
- E. pumilum*, Nutt.—Prairies of Milk River, May 28.
- Grindelia squarrosa*, Dunal.—Abundant in bottom-lands. Blossoms in July and August.
- Gutierrezia euthamiae*, T. and G.—Clark's Fork, September 1.
- Gaillardia aristata*, Pursh.—Sandy Bluffs of Sunday Creek, June.
- Helianthus lenticularis*, Dougl. (Western Sunflower).—Very common in the Missouri and Yellowstone Valleys. Blossoms in July and August.
- H. Maximilianus*.—Musselshell River, August 15; Big Rosebud, August 19.
- H. strumosus*, L.—Missouri Valley.
- Hymenopappus tenuifolius*, Pursh.—Yellowstone, Missouri Falls, May 30.
- Hieracium Canadense*, Michx. (Canada Hawk-Weed).—Big Rosebud, August.
- Iva axillaris*, Persh.—Mouth of Sunday Creek.
- I. Xanthiiifolia*, Nutt.—Common on Yellowstone.
- Kuhnia eupatorioides*, L.—Big Rosebud, August.
- Liatris punctata*, Hook. (Punctated Blazing Star).—Very common in open prairies. Blossoms in July to September.
- L. scariosa*, Willd.—Fort Stevenson, May.
- Lepachys columnaris*, T. & G.—Cedar Creek, Sunday Creek, July.
- L. Columnaris*, var. *pulcherrima*.—Porcupine Creek, August.
- Lygodeemia juncea*, Don.—Very common in low prairies; Sunday Creek, August.
- Lactucae canadensis* (Wild Lettuce), var. *sanguinea*, T. & G.—Big Rosebud, August.
- Macrorrhynous troximoides*, T. & G.—Cedar Creek, July.
- Mulgedium pulchellum*, Nutt. (False Lettuce).—Common in low prairies. Cedar Creek, July.
- Rudbeckia laciniata*, L.—Big Rosebud, August.
- Salidaga rigida*, L. (Golden Rod).—Common in shady spots. Big Rosebud, August.
- S. canadensis*, L.—Rocky Fork, August.
- S. incana*.—Rocky Fork, August.
- Senecio Canus* Hook. (Groundsel).—Yellowstone.
- S. integrifolius*, Nutt.—Prairies of Milk River, May.
- Thelesperma gracile*, Gr.—Falls of the Missouri, May 30.
- Troximon glaucum*, Nutt.—Big Rosebud, August; prairies of Milk River, small form, May 28.
- T. cuspidatum*, Pursh.—Yellowstone, Upper Missouri, May.
- Xanthium strumarium*, L. (Common Cocklebur).—Exceedingly common in all bottoms. Porcupine Creek, July.

LOBELIACEÆ.

(*Lobelia* Family.)

Lobelia Kalmii, L.—Judith Basin, September.

CAMPANULACEÆ.

(*Campanula* Family.)

Campanula rotundifolia, L. (Harebell).—Sunday Creek, July 3; Clark's Fork, September 2. Common.

ERICACEÆ.

(*Heath* Family.)

Arctostaphylos Uva-ursi, Spreng. (Bearberry).—Bluffs of Upper Missouri, Little Rocky Mountains, Judith Basin, September 24; berries ripe.

PLANTAGINACEÆ.

(*Plantain* Family.)

Plantago major, L. (Common Plantain).—Big Rosebud, August.

P. Patagonica, Jacq., var. *gnaphaloides*, Gr.—Quite common on the low prairies of the Yellowstone.

P. pusilla, Nutt.—Alkali banks of Upper Missouri.

PRIMULACEÆ.

(Primrose Family.)

Lysimachia ciliata, L.—Head of Cedar Creek, July.*L. quadrifolia*, L.—Missouri Valley at Fort Stevenson.*Dodecatheon Meadia*, L. (American Cowslip).—Dauphine Rapids (Upper Missouri), May 2; Middle Yellowstone, May 26.*Androsace occidentalis*, Pursh.—Dauphine Rapids (Upper Missouri), May 2.

AROBANCHACEÆ.

(Brom-rape Family.)

Aphyllon fasciculatum, T. & G.—High prairies at head of Sunday Creek, August 1.

Past flowering.

Phelipaea Ludoviciana, Don.—Sandy plateaus of Sunday Creek, August. Common.

SCROPHULARIACEÆ.

(Figwort Family.)

Pentstemon acuminatus, Dougl.—Lower Yellowstone, May. A very handsome species, with sky-blue (purple base) flowers and soft, green, glaucous leaves; seen in a stunted form along Northern Pacific Railroad, June 8.*P. albidus*, Nutt.—Lower and Middle Yellowstone, June; banks of Upper Missouri, May 20.*P. caeruleus*, Nutt.—Banks of Upper Missouri, May.*P. Cristatus*, Nutt.—Lower Yellowstone, June.*Castilleja sessiliflora*, Pursh.—Rocky Bluffs; common on Middle Yellowstone; Milk River, May.*C. affinis*, H. & A.—Clark's Fork Cañon, in a mountain brook, September 4; flowers fading.*C. linariaefolia*, Benth.—Shoshone Mountains, September 10.*Orthocarpus luteus*, Nutt.—Middle Yellowstone.*Mimulus luteus*, L. (Yellow Monkey-Flower).—Big Rosebud, August.*Veronica anagallis*, L. (Water Speedwell).—Big Rosebud, August.*Synthyris plantaginea*, Benth.—Fort Assinaboine (Milk River), May 25, past flowering.

VERBENACEÆ.

(Vervain Family.)

Verbena bracteosa, Michx.—Middle Yellowstone.*V. hastata*, L. (Blue Vervain).—Big Rosebud, August.

LABIATÆ.

(Mint Family.)

Mentha Canadensis, L. (Wild Mint).—Very common in low, damp places*Lycopus sinnostus*, Benth. (Water Horehound).—Big Rosebud; Crow Agency; August.*Hedeoma Drummondii*, Benth.—Middle Yellowstone.*Stachys palustris*, L. (Swamp Hedge-Nettle).—Var. *Cordata*, Gr.—Big Rosebud, August.*Monarda fistulosa*, L. (Horse-Mint; Wild Bergamot).—Willow Creek; Rig Rosebud; August.

BORRAGINACEÆ.

(Borage Family.)

Mertensia lanceolata, D. C.—Lower Yellowstone, May.*Echinospermum deflexum*, Lehm.—Cedar Creek, July.*E. Redovskii*, Var. *Cupulatum*, Gr.—Middle Yellowstone.*Chamaerhodus erecta*, Bunge.—Yellowstone.*Exitrichium glomeratum*, D. C.—Ridges of Lower Yellowstone*E. crassisepalum*, Torr.—Lower Yellowstone.*Lithospermum angustifolium*, Michx.—Missouri and Yellowstone; common.

L. Canescens, Lehm. (Hoary Puccoon).—Banks of Upper Missouri; common; May.
L. pilosum, Nutt.—Yellowstone.
Heliotropium Curassaricum, L.—Lower Yellowstone, May 25.

HYDROPHYLACEÆ.

(Waterleaf Family.)

Phacelia Menziesii, Torr.—Yellowstone; Missouri Falls, May 30.
Ellisia ambigua, Nutt.—Common in low, sandy prairies; Sandy Creek, June.
E. Nyetelea, L.—Yellowstone.

POLEMONIACEÆ.

(Polemonium Family.)

Collomia linearis, Nutt.—Bad-lands of Sunday Creek.

Phlox subulata, L. (Ground or Moss Pink).—Very common in the high prairies and bluffs of the Missouri; also found on Yellowstone and Musselshell. Blossoms early in May, when it covers the prairies with its delicate white flowers. This form has white, entire petals.

CONVOLVULACEÆ.

(Convolvulus Family.)

Evolvulus argenteus, Pursh.—Yellowstone.

Calystegia sepium, R. Br. (Hedge Bindweed).—Yellowstone, July; Porcupine Creek.

SOLANACEÆ.

(Nightshade Family.)

Physalis Pennsylvanica, L.—Yellowstone (mouth of Sunday Creek), August.

Solanum rostratum, Dunal.—Sandy slopes of Sunday Creek, July.

GENTIANACEÆ.

(Gentian Family.)

Gentiana affinis, Smith.—Musselshell; Shoshone Mountains; Judith Basin; August and September.

G. barbellata, Eng.—Slopes of Shoshone Mountains, September.

G. Amarella, L.—Judith Basin, September.

Frasera speciosa, Dougl. (American Columbo).—Shoshone Mountains and Judith Basin; September, in seed.

APOCYNACE.

(Dogbane Family.)

Aposeynum cannabinum, L. (Indian Hemp).—Missouri Bottom.

A. androsa mifolium, L. (Spreading Dogbane).—Sunday Creek, August.

ASCLEPIADACEÆ.

(Milkweed Family.)

Asclepias incarnata, L. (Swamp Milkweed).—Musselshell, August.

A. Cornuta, Dec. (Common Milkweed).—Very common; Sunday Creek, Big Horn, and westward.

Acerates decumbens, Dec.—Musselshell, August 10, in fruit.

A. viridiflora, Ell.—Musselshell, August 10, in fruit.

OLEACE.E.

(Olive Family.)

Fraxinus Americana, L. (White Ash).—High grounds of Missouri bottoms and ravines. From Lincoln to Carroll in small groves. On Yellowstone above Tongue River. Middle-sized tree not very suitable for timber but supplying excellent fuel to steamboats.

NYCTAGINACEÆ.

(Four-o'clock Family.)

Oxybaphus albidus, Sweet.—Sunday Creek, July.

CHENOPODIACEÆ.

(Goosefoot Family.)

Chenopodium album, L. (Lambs Quarters).—Very common on sandy, alkali bottoms.
Eurotia lanata, Mog. (White Sage).—Common on sandy bluffs and bad-lands. Sunday Creek, July.

Suaeda Torreyana, Gr.—Bad-lands of Sunday Creek, July.*Monelepis chenopodirides*, Mog.—Sunday Creek.*Atriplex patula*, L.—Sunday Creek.*Obione confertifolia*, Torr.—Common on sandy, alkali ridges; Sunday Creek, July.*O. canescens*, Mog.—Sandy bluffs. Sunday Creek, July.*O. argentea*, Mog.—Sandy bluffs; Sunday Creek, July.

Corispermum hysopifolium, L. (Bug-Seed).—Characteristic of bad-lands above and below Fort Peck; October, in seed.

Sarcobatus vermiculatus, Torr. (Grease-Bush).—Common on alkali buttes of Middle Yellowstone; June 25, beginning to blossom.

POLYGONACEÆ.

(Buckwheat Family.)

Polygonum aviculare, L. (Knot-Grass; Goose-Grass).—Sunday Creek, July.*P. aviculare*, Var. *erectum*. Roth.—Middle Yellowstone, August.*P. tenne*, Michx.—Middle Yellowstone.*P. dumetorum*, L. (Climbing False Buckwheat).—Big Rosebud, August.*P. amphibium*, L. (Water Persicaria).—Sunday Creek, July.*Rumex salicifolius*, Weinman (White Dock).—Sunday Creek, July.*R. venosus*, Purch.—Sunday Creek, June; Upper Missouri, May.*Eriogonum annuum*, Nutt.—Mouth of Sunday Creek, August.*E. multiceps*, Ker.—Bluffs of divide between Yellowstone and Missouri July*E. cernuum*, Nutt.—Pompey's Pillar, August.*E. flavum*, Nutt.—Bluffs of Middle Yellowstone.*E. umbellatum*, Torr.—Shoshone Mountains, September.

ELÆAGNACEÆ.

(Oleaster Family.)

Sheperdia argentea, Nutt. (Buffalo-Berry).—Common on Missouri, Yellowstone, and Musselshell. Blossoms in May; fruit ripe in August, but most palatable in October and November.

S. canadensis, Nutt. (Canadian Sheperdia).—Judith Basin, September 24; no fruit seen.

Oleaquus argentea, Purish. (Silver Berry).—Head of Cherry Creek, July; Judith Basin, September, in fruit.

SANTULACEÆ.

(Sandalwood Family.)

Comandra umbellata, Nutt.—Fort Buford, May. Common on bluffs and prairies of Upper Missouri.

EUPHORBIACEÆ.

(Spurge Family.)

Euphorbia marginata, Pursh.—Mouth of Sunday Creek and Yellowstone, Aug.*E. dictyosperma*, Fisher and M.—Yellowstone, August, in fruit.*E. montana*, Engelm.—Bluffs of Middle Yellowstone, June.*E. glyptosperma*, Engelm.—Bluffs of Middle Yellowstone, June.

URTICACEÆ.

(Nettle Family.)

Urtica gracilis, Art.—Cedar Creek. July.*Humulus lupulus*, L. (Common Hop).—Missouri and Yellowstone, Cedar Creek, July.

Ulmus Americana, L. (American or White Elm).—High grounds of Missouri Valley. Next to Cottonwood the most common tree below Buford; scarce above Buford; not seen above Peck. Small tree, rarely more than 12 to 18 inches in diameter. Worthless as fuel. Blossoms in April.

CUPULIFERÆ.

(Oak Family.)

Quercus macrocarpa, Michx. (Bur-Oak; Mossy Cup; White Oak).—Missouri Valley from Fort Stevenson down.

BETULACEÆ.

(Birch Family.)

Betula occidentalis, Hook. (Western Birch).—Clark's Fork, Judith Basin; September, Fort Assinnaboine.

Alnus incana, var. *glauca*, Ait. (Speckled Alder).—Big Rosebud, August.

SALICACEÆ.

(Willow Family.)

Salix cordata, Muh. (Heart-leaved Willow).—The prevalent species on the Missouri. Common on Yellowstone, Musselshell, Big Rosebud, and People's Creek.

S. longifolia, Muhl. (Long-leaved Willow).—Common on Upper Missouri and Yellow-stone.

S. discolor, Muhl. (Glaucous Willow).—Big Rosebud, People's Creek.

S. nigra, March. (Black Willow).—Yellowstone, Big Rosebud, Cedar Creek.

Populus monilifera, Ait. (Cottonwood).—Forms the bulk of the timber on all bottoms from the Lower Missouri to the foot of the Rocky Mountains. It extends on the Missouri to Fort Benton; on the Yellowstone, nearly to the Cañon; on Milk River, beyond the boundary line. Beautiful tree often attaining a diameter of 6 feet. Supplies steamboats with most of their fuel.

P. angulata, Ait. (Angled Cottonwood).—Found with the latter but much rarer.

P. tremuloides, Michx. (American Aspen).—Headwaters of Big Rosebud and Clark's Fork.

P. angustifolia, James (Willow-leaved Poplar).—Common on the Upper Yellowstone and tributaries, where it replaces the monilifera. First appears on the Missouri above Marais River. Common on Teton and Marais rivers. Found at the Falls of the Missouri. Not seen on Milk River, but no doubt growing on its northern affluents.

P. balsamifera, L. (Balsam Poplar).—Always found with the latter but rarer. A few specimens at Fort Assinaboine.

CONIFERA.

(Pine Family.)

Pinus ponderosa, Dougl. (Yellow Pine; Bluff Pine).—The prevalent pine of this region; a small, stunted form. From the 107° longitude to the Rocky Mountains.

P. flexilis, James (Flexible Pine).—Shoshone Mountains.

Abies Douglasii, Lind.—Shoshone Mountains; bluffs of Upper Missouri. A lofty, handsome tree.

Juniperus communis, L. (Common Juniper).—Var. *Alpina*, L.—Shoshone Mountains; Judith Basin.

J. Virginiana, L. (Red Cedar).—Common on Missouri above the Little Missouri and on Yellowstone westward of Tongue River. High bluffs below the altitude of the pine.

J. Sabina, var. *procumbens*, Pursh. (Savin; Ground or Creeping Cedar).—Very common on rocky bluffs of Missouri and Yellowstone; not seen on the mountains.

TYPHACEÆ.

(Cat-tail Family.)

Typha latifolia, L. (Common Cat-tail).—Lower Missouri

ALISMACEÆ.

(Water Plantain Family.)

Alisma plantago, L. var. *Americanum*.—Swamps near the Big Muddy; Upper Missouri.

ORCHIDACEÆ.

(Orchis Family.)

Habenaria hyperborea, Gr.—Head of Clark's Fork, September.

IRIDACEÆ.

(Iris Family.)

Sisyrinchium Bermudiana, L. var. *mucronatum*, Gr. (Blue-eyed Grass).—Cedar Creek; July in fruit.

SMILACEÆ.

(Smilax Family.)

Smilax herbacea, L. (Carrion-Flower)—Missouri Valley, below Buford.

LILIACEÆ.

(Lily Family.)

Leucocrinum montanum, Nutt. (Prairie Lily).—Lower Yellowstone, June 1; a very pretty ornamental species.*Smilacina stellata*, Desf.—Musselshell; Milk River, May.*Calochortus nuttallii*, T. & G. (Sego).—Common on the Middle Yellowstone, June.*Fritillaria atropurpurea*, Nutt.—Middle Yellowstone and Judith Basin, on broken prairie; a very elegant species; blossoms in May and June; seed ripe in July.*F. pudica*, Spreng.—Common on prairies of Judith Basin. In blossom at Dauphine Rapids (Missouri) May 2; in seed at Fort Assinaboine (Milk River) May 20.*Zigadenus nuttallii*, Gr.—Common on dry prairies of Yellowstone and Judith Basin.*Z. paniculatus*, Watson.—High prairies of Milk River; Middle Yellowstone, May and June.*Allium reticulatum*, Fraser. (Reticulated Garlic).—Very common on Upper Missouri and Yellowstone; May, July.*A. cernuum*, Roth. (Wild Onion).—Bad lands of Upper Missouri.*Yucca angustifolia*, Pursh. (Adam's Needle).—Bluffs of Missouri above Fort Buford. Common on Yellowstone; Junie, July; fruit ripening in August.

COMMELYNACEÆ.

(Spiderwort Family.)

Tradescantia Virginica, L. (Common Spiderwort).—Sandy plains near Sandy Creek, June.

CYPERACEÆ.

(Sedge Family.)

Scirpus sylvaticus, L.—Missouri Valley.*Carex filifolia*, Nutt.—The prevalent sedge on prairies of Milk River, around Fort Assinaboine.

GRAMINEÆ.

(Grass Family.)

Andropogon furcatus, Muhl. (Beard Grass).—Missouri Valley; common.*A. scoparius*, Michx.—Open prairies of Missouri and Yellowstone; common.*Aristida purpurea*, Nutt.—Buttes near Porcupine Creek, August.*Bouteloua Oligostachya*, Torr. (Buffalo-Grass).—The prevalent grass of the open prairie west of the Missouri, July.*B. curtipendula*, Var. *aristosa*, Gr.—Mouth of Sunday Creek, Upper Missouri, July.*Bromus ciliatus*, L.—Bid Rosebud, August.*Beckmannia cruciformis*, Host.—Big Muddy, Missouri Valley.*Buchloe seslerioides*.—Sunday Creek, Yellowstone.*Brizypyrum spicatum*, Hook.—Sunday Creek, Yellowstone.*Calamagrostis longifolia*, Hook.—Yellowstone and Missouri.*C. sylvatica*, D. C.—Mouth of Sunday Creek, Yellowstone Valley.*C. stricta*, Trin.—Yellowstone Valley.

Elymus Canadensis, Beauv.—Very common on the Yellowstone, Missouri Valley.
E. sitianion, Shult.—Common on Sunday Creek and other tributaries of Middle Yellowstone.

E. condensatus, Presl.—Yellowstone.

Eragrostis poaeoides, Beauv., var. *megastachya*, Gr.—Yellowstone.

Eleocharis acicularis, Br.—Yellowstone.

Eriocoma cuspidata, Nutt.—Very common on the plateaus of the Yellowstone region.

Hordeum pratense, Huds.—Common on bottoms and slopes.

H. jubatum, L. (Squirrel-tail Grass).—Common on bottoms and slopes.

Lepturus paniculatus, Nutt.—Yellowstone.

Muhlenbergia glomerata, Trin.—Big Rosebud, August 30.

M. Mexicana, Trin.—Big Rosebud, August 30.

Munroa squarrosa, Torr.—Yellowstone.

Poa tenuifolia, Nutt.—Prairies of Upper Missouri and Milk River.

Phalaris arundinacea, L. (Reed-Canary Grass).—Missouri and Yellowstone Valleys.

Phragmites communis, Trin. (Common Reed).—Common in swamps of Missouri Valley.

Stipa comata, Trin. (Porcupine Grass).—Very common on the plateaus of the Yellowstone region, west of Custer Creek. Blossoms in June. From July to October a very troublesome grass, the seeds adhering by their barbed-pointed base to everything they touch.

S. spartea, Trin.—Prairies of the Missouri.

S. viridula, Trin.—Sparse on Yellowstone and Missouri prairies.

Spartina cynosuroides, Willd.—Missouri bottom.

S. gracilis, Trin.—Sunday Creek, July.

Sporobolus airoides, Torr.—Low prairies of Yellowstone.

S. ramulosus, Kth.—Low prairies of Yellowstone.

Triticum repens, L. (Quick-Grass).—Abundant all over this region. Sunday Creek, July. In places gives a bluish tinge to the prairie.

T. aegilopoides, Turez.—Missouri Valley.

T. violaceum, Horn.—Yellowstone and Missouri.

Vilfa cuspidata, Torr.—Yellowstone and Missouri.





